

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): A plasma processing apparatus for conducting a switched process cycle in which an deposition step and an etch step are cyclically executed; said apparatus comprising:

a chamber having a support for a substrate;

at least one gas inlet into the chamber;

means for alternately and repeatedly introducing an etch gas and a deposition gas into the chamber through the at least one gas inlet, wherein the deposition gas is different than the etch gas, wherein the deposition gas is for the deposition step of each cycle in which a passivation layer is deposited on the substrate and the etch gas is the etch step of each cycle in which the passivation is selectively removed;

means for striking a plasma into the etch gas and the deposition gas alternately introduced into the chamber;

attenuation means for partially reducing and/or homogenizing the ion flux from the plasma substantially without affecting the neutral radical number density so that sufficient ions are available to selectively remove the passivation layer during the etch step of each cycle; and

means for accelerating the available ions onto the substrate.

Claim 2 (cancelled).

Claim 3 (withdrawn): A plasma processing apparatus according to claim 1, further comprising a further means for striking a plasma which is positioned below the level of the attenuation means.

Claim 4 (previously presented): A plasma processing apparatus according to claim 1, wherein at least a portion of the chamber is formed of a dielectric material.

Claim 5 (withdrawn): A plasma processing apparatus according to claim 4 wherein the attenuation means is positioned at about the mid-point of the portion formed of a dielectric material.

Claim 6 (previously presented): A plasma processing apparatus according to claim 4, wherein an antenna is positioned externally adjacent the dielectric portion to create a plasma production region in the chamber.

Claim 7 (previously presented): A plasma processing apparatus according to claim 1, wherein the attenuation means comprises a magnetic portion.

Claim 8 (original): A plasma processing apparatus according to claim 7, wherein the attenuation means comprises one or more permanent magnets.

Claim 9 (previously presented): A plasma processing apparatus according to claim 7, wherein the attenuation means comprises means for creating an electromagnetic field.

Claim 10 (withdrawn): A plasma processing apparatus according to claim 9 wherein said means for creating an electromagnetic field comprises an array of electromagnetic coil groups separately orientated to create respective magnetic fields which are angularly offset with respect to one another.

Claim 11 (withdrawn): A plasma processing apparatus according to claim 10 wherein three sets of coil groups are provided which are designed to create magnetic fields which are offset from one another by 60 degrees or 180 degrees.

Claim 12 (previously presented): A plasma processing apparatus according to claim 9, wherein the means for creating an electromagnetic field is capable of creating a variable field.

Claim 13 (previously presented): A plasma processing apparatus according to claim 1, wherein the attenuation means comprises one or more tubular members carrying magnets and/or conductors to form an electromagnet.

Claim 14 (previously presented): A plasma processing apparatus according to claim 1, wherein the attenuation means is temperature controlled.

Claim 15 (original): A plasma processing apparatus according to claim 14, including a distribution member to distribute a cooling medium to the attenuation means.

Claim 16 (withdrawn): A plasma processing apparatus according to any preceding claim, wherein the attenuation means comprises one or more strong magnets preferably positioned outside the plasma chamber.

Claim 17 (withdrawn): A plasma processing apparatus according to claim 1, wherein the attenuation means comprises a sheet member having a plurality of apertures therein.

Claim 18(withdrawn): A plasma processing apparatus according to claim 16, wherein the sheet member is heated.

Claim 19 (withdrawn): A plasma processing apparatus according to claim 1, wherein a means for striking the plasma is positioned above the level of the attenuation means and a means for striking the plasma is positioned below the level of the attenuation means.

Claim 20 (withdrawn): A plasma processing apparatus according to claim 1, further comprising two dielectric portions of the chamber, wherein the attenuation means is positioned therebetween.

Claim 21 (previously presented). A plasma processing apparatus according to claim 1, wherein the attenuation means is designed to produce a high magnetic field capable of significantly reducing the ion flux during the etch step.

Claim 22 (withdrawn): A plasma processing apparatus according to claim 1, further comprising means for guiding neutral radicals.

Claim 23 (withdrawn): A plasma processing apparatus according to claim 22, wherein the guiding means is positioned between the attenuation means and the substrate.

Claim 24 (withdrawn): A plasma processing apparatus according to claim 22, wherein at least a part of the guiding means is positioned close to the substrate.

Claims 25-28 (cancelled).

Claim 29 (withdrawn): A guiding means for use in a plasma processing apparatus having means for striking a plasma in a chamber, wherein the guiding means is capable of guiding neutral.

Claim 30 (withdrawn): A guiding means according to claim 30, wherein the apertures are shaped in relation to a pattern exposed on a substrate.

Claim 32 (withdrawn): A guiding means according to claim 29 which comprises a disc.

Claim 33 (withdrawn): A guiding means according to claim 29, wherein, in use, at least part thereof is parallel to a substrate positioned in the chamber.

Claim 34 (withdrawn): A plasma processing apparatus comprising means for striking a plasma in a chamber having a gas inlet and a support for a substrate, wherein the apparatus further comprises a guiding means according to claim 29.

Claim 35 (withdrawn): A method of etching a feature in a substrate in a chamber, the method comprising striking a plasma in the chamber and reducing and/or homogenizing the in flux from the plasma substantially without affecting the radical number density.

Claim 36 (withdrawn): A method according to claim 35, further comprising the step of alternately etching the substrate and depositing a passivation layer on the substrate.

Claim 37 (withdrawn): A method according to claim 36, wherein the power supplied to the plasma during etching is greater than that during deposition.

Claim 38 (withdrawn): A method according to claim 36, wherein the strength of the attenuation means may be varied for each of the deposition and/or etch steps.

Claim 39 (withdrawn): A method according to claim 36, wherein the attenuation means comprises means for creating an electromagnetic field which is reduced or switched off during the deposition step.

Claim 40 (withdrawn): A method of etching a feature in a substrate in a chamber, the method comprising alternately etching the substrate and depositing a passivation layer on the substrate, wherein neutral radicals during the etch step are guided by a guiding means to improve the uniformity of etching across the substrate.

Claim 41 (withdrawn): A method according to claim 40, further comprising the step of reducing and/or homogenizing the ion flux from the plasma, prior to the guiding of neutral radicals, substantially without affecting the radical number density.

Claim 42 (withdrawn): A method according to claim 41, wherein the ion flux is reduced or homogenized during the etch step only.

Claim 43 (withdrawn): A method of etching a feature in a substrate, the method comprising applying a pulsed high power to an etch source gas, and alternately etching the substrate and depositing a passivation layer on the substrate in a chamber.

Claim 44 (withdrawn): A method according to claim 43, wherein the power density of the pulsed high power is between 10 and 300 W/cm³.

Claim 45 (withdrawn): A method according to claim 43, further comprising the step of reducing and/or homogenizing the ion flux from the plasma substantially without affecting the radical number density.

Claim 46 (withdrawn): A method according to claim 43, further comprising the step of guiding neutral radicals of the etch source gas to improve the uniformity of etching across the substrate.

Claim 47 (withdrawn): A plasma processing apparatus for performing the method of claim 43, the apparatus comprising a first chamber having an inlet for an etch source gas and a second chamber having a support for substrate, wherein the first and second chambers are connected via an aperture, and wherein the apparatus further comprises a means for providing pulsed high power to the first chamber.

Claim 47 (withdrawn): A plasma processing apparatus according to claim 46, further comprising attenuation means in the region of the aperture.

Claim 48 (withdrawn): A method of etching a feature in a substrate, the method comprising applying a high density radical source to an etch source gas, and alternatively etching the substrate and depositing a passivation layer on the substrate in a chamber.

Claim 50 (cancelled).